

Databases and SQL

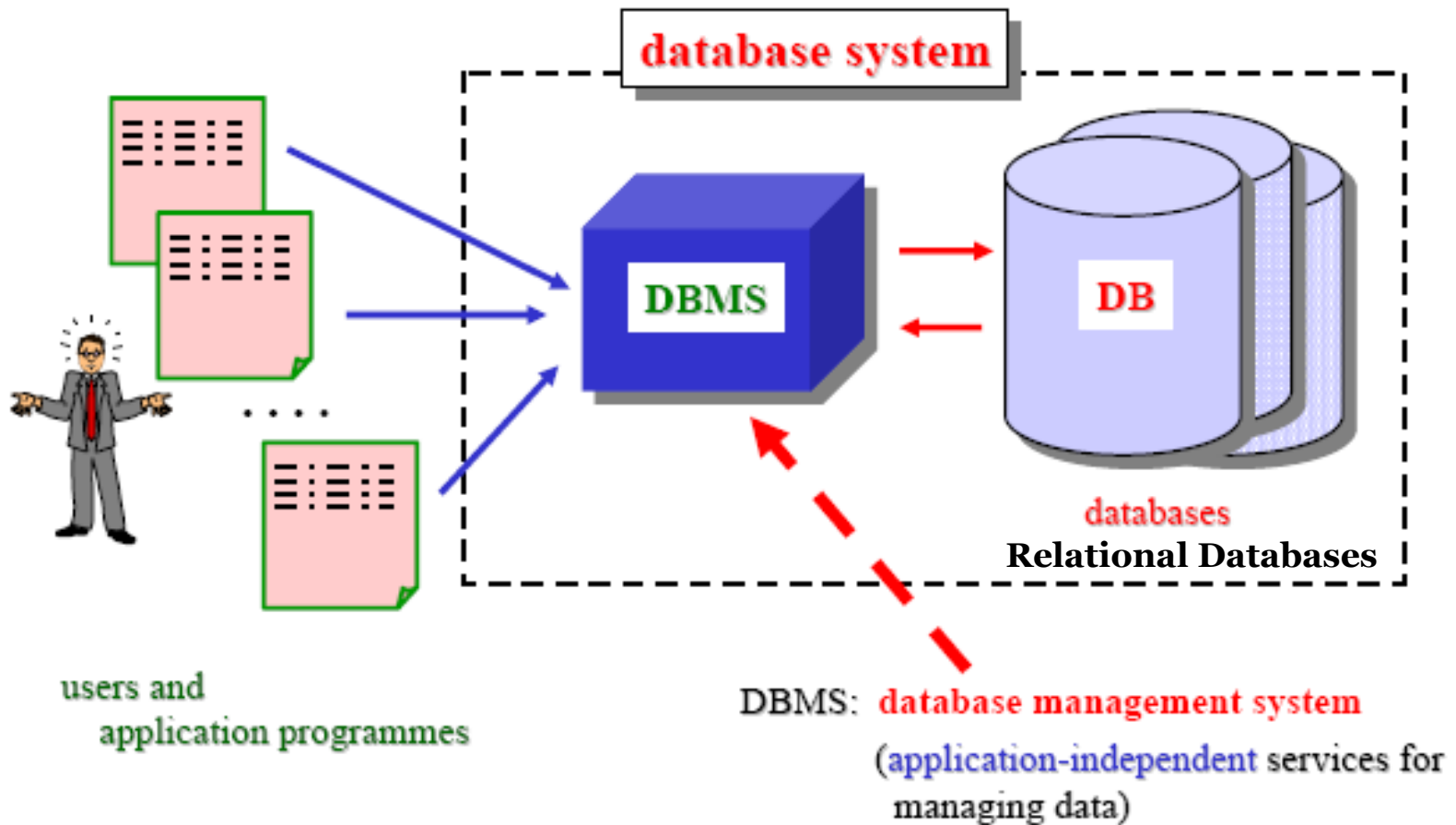
Practical “The Bioinformatics Lab”

Tatyana Goldberg
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Outline

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Relational Database Management System (RDBMS)



MySQL



- RDBMS
- Uses Structural Query Language (SQL)
- Open Source Software
- Client/server architecture
- Wide range of MySQL API's available
(Perl, Java, PHP, Python, Ruby, C++, etc.)
- Fast, reliable and easy to use
- Desktop software and web applications available
(e.g. MySQL Navigator or phpMyAdmin)
- <http://www.mysql.com/>

MySQL: Installation

1. Install the MySQL server package

```
sudo apt-get install mysql-server
```

2. Set up the root password for the server

The package includes:

- MySQL server
- client programs
(e.g. `mysql`, `mysqladmin`, `mysqldump`)
- client library



MySQL: Server Connection

1. Log in to the MySQL server

```
mysql -u root -p
```

2. Enter the password

```
Enter password: *****
```

```
Welcome to the MySQL monitor.  Commands end with ; or \g.
```

```
Your MySQL connection id is 28
```

```
Server version: 5.0.51a-24+lenny4 (Debian)
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the buffer.
```

```
mysql>
```

3. Logout

```
mysql> quit
```

```
Bye
```

MySQL: Administration

- MySQL is a sophisticated multi-user privilege system
- Privilege – right to perform a particular action on a particular object associated with a particular user
- Only root has the highest level of privilege
- Privilege tables contained in the **mysql** database are:

user	db	host
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- Reload MySQL after setting privileges

```
mysqladmin -u root -p reload
```

MySQL: Administration (Example)

- Give localhost permission to access all databases:

```
mysql> INSERT INTO host(host,db,Select_priv,Insert_priv,Update_priv,  
Delete_priv,Create_priv, Drop_priv)  
-> VALUES ('localhost','%', 'Y', 'Y', 'Y', 'Y', 'Y', 'Y');
```

- Create a new user 'mario' who can access the MySQL server from localhost:

```
mysql> INSERT INTO user(host, user, password)  
-> VALUES ('localhost', 'mario', password('mammamia'));
```

- Give 'mario' permission to access the database 'marios_db' from localhost:

```
mysql> INSERT INTO db (host,db,user,Select_priv,Insert_priv,Update_priv,  
Delete_priv,Create_priv, Drop_priv)  
-> VALUES ('localhost','marios_db','mario', 'Y', 'Y', 'Y', 'Y', 'Y', 'Y');
```

- Create the database 'marios_db':

```
mysqladmin -u root -p create marios_db
```

Perl DBI (packages perl, libdbi-perl)

```
use DBI;
my $dsn='dbi:mysql:marios_db';
my $user='mario';
my $pass='mammamia';
my $dbh = DBI->connect($dsn,$user,$pass) or
    die "Can't connect to the database: $DBI::errstr\n";

# INSERT example
my $sth2=$dbh->prepare('INSERT INTO pizza(id, price)
    values ("tonno", 5)');
$sth2->execute();
$sth2->finish();

# SELECT example
my $sth3=$dbh->prepare('SELECT * FROM pizza');
$sth3->execute();
while(my @row=$sth3->fetchrow_array()){
    print "$row[0] - $row[1]\n";
}
$sth3->finish();


$dbh->disconnect();
```


phpMyAdmin

Requirements: Apache2, PHP, MySQL

1. Install the **phpmyadmin** package
Choose Apache2 web server
2. Add to the end of the file `/etc/apache2/apache2.conf`
`Include /etc/phpmyadmin/apache.conf`
3. Restart Apache2
`sudo /etc/init.d/apache2 restart`
4. Point your browser to **`https://localhost/phpmyadmin`**

phpMyAdmin

 <https://localhost/phpmyadmin/>



Welcome to phpMyAdmin

Language ⓘ

Log in ⓘ

Username:

Password:

ⓘ Cookies must be enabled past this point.

phpMyAdmin

The screenshot shows the phpMyAdmin web interface running in a browser. The browser's address bar displays the URL: `https://localhost/phpmyadmin/index.php?lang=en-utf-8&token=78566a60817eb51b3d2eaac5c0fbed70`. The page title is "localhost / localhost phpMyAdmin 2.11.8.1deb5+lenny4".

The interface is divided into several sections:

- Left Sidebar:** Contains the phpMyAdmin logo, navigation icons, and a list of databases: "information_schema (17)" and "marios_pasta (0)". Below this, it says "Please select a database".
- Top Section (localhost):** Displays server information: "Server version: 5.0.51a-24+lenny4", "Protocol version: 10", "Server: Localhost via UNIX socket", and "User: mario@localhost". It also shows "MySQL charset: UTF-8 Unicode (utf8)" and "MySQL connection collation: utf8_unicode_ci". There is a "Create new database" form with the name "marios?pasta" and a "Create" button. Below this are links for "Show MySQL runtime information", "Show MySQL system variables", "Processes", "Character Sets and Collations", "Storage Engines", "Databases", "Export", "Import", and "Log out".
- Right Section (phpMyAdmin - 2.11.8.1deb5+lenny4):** Displays client and PHP information: "MySQL client version: 5.0.51a" and "Used PHP extensions: mysql". It includes a "Language" dropdown set to "English" and a "Theme / Style" dropdown set to "Original". There is also a "Font size" dropdown set to "82%". Below these are links for "phpMyAdmin documentation", "phpMyAdmin wiki", "Official phpMyAdmin Homepage", and "[ChangeLog] [Subversion] [Lists]".
- Bottom Right:** Features the phpMyAdmin logo and a link to "Open new phpMyAdmin window".

What have we learned?

- To install and configure a MySQL server
- To provide users with privileges to access the database
- To use the Perl DBI module to communicate with the MySQL server
- To install and use phpMyAdmin for MySQL administration over the Internet

Questions

